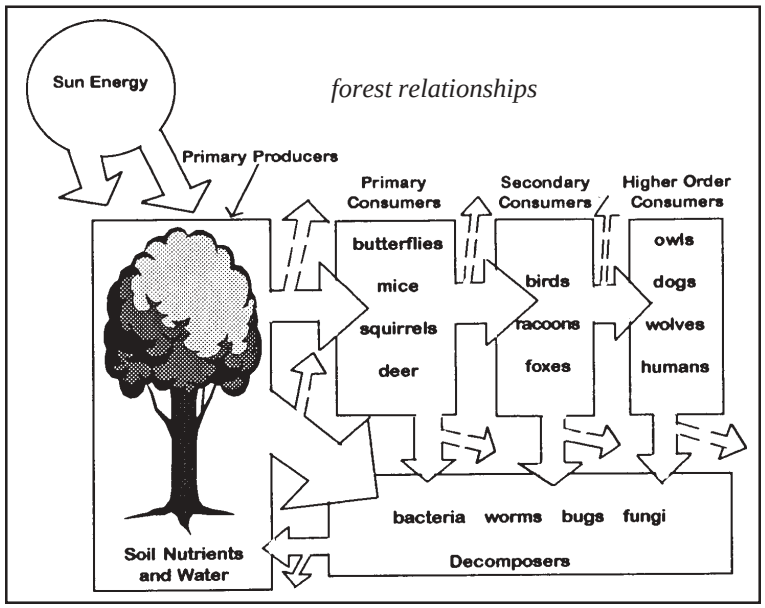
UNIT 2
LIFE IN THE FOREST

Habitat Needs

A forest's plants and animals, interacting with the physical environment, form an ecosystem. The amount of usable habitat in this ecosystem is the most important influence on the diversity of wildlife. An animal's **habitat** must provide food, water, shelter, and space. Suitable arrangement of these ingredients also is crucial. If an animal's habitat needs are not met, it no longer can survive in the area. Knowing the habitat requirements of different animals helps natural resource professionals better manage them.

The diversity and abundance of animal life in Iowa's forests is never static. Passenger pigeons, elk, deer, black bear, mountain lions, wolves, rattlesnakes, and swallow-tailed kites inhabited Iowa's wooded areas in pioneer times. Euro-American settlers drove some species of wildlife to extinction through persecution and/or unregulated harvest. Other species moved to areas less impacted by humans. Many forest animals and plants now exist only in isolated pockets of habitat (**refuges**). Some species have adapted to the human sculpted landscape and some have even increased in numbers (e.g., raccoon, white-tailed deer). Animals that are **generalists** (eat a wide variety of foods and have flexible shelter, nesting, or denning requirements) adapt to habitat changes more easily than **specialists** (have a narrow range of food preferences and require specific shelter, nesting, or denning sites).

Plants and animals vary in their ability to adapt to changes in their environments. White-tailed deer and wild turkey were hunted to extremely low numbers in the state in the early 1900s. Because of reintroduction and wildlife management, there are more deer and turkey than when the Euro-Americans settled Iowa. Raccoons, coyotes, and great-horned owls (all generalists) have adapted to humans and their numbers have increased. Amazingly, several species of **area-sensitive** (require large, interconnected chunks of habitat) specialists that had been absent from Iowa for decades are beginning to reappear. Bald Eagles have returned as a nesting species to the forested areas along Iowa's major rivers. Bobcats are regularly sighted in the larger tracts of Iowa forests. Even mountain lion and elk are making excursions back into the state. Perhaps some of these specialists have gained a new tolerance for the presence of humans and, when left undisturbed, may once again thrive in Iowa.



The Edge Effect

white-tailed deer

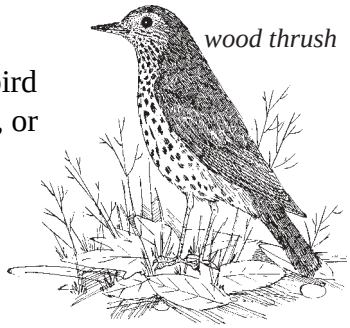
Some animals require **edge habitat** (the area where two plant communities meet). The edges of forested areas receive more sunlight than under the forest canopy. More shrubs and grasses are found here. Many animals benefit from forest edge habitat. White-tailed deer are **browsers** (eat the twigs and leaves of woody plants) and depend on abundant shrubby vegetation on forest edges for food. Red-tailed hawks need trees for shelter and nesting sites, but hunt in open grasslands. The ruffed grouse of northeastern Iowa needs forest clearings or edge to provide thick shrubby cover. Eastern bluebirds need tree cavities to nest in and open grassy areas to hunt insects.

Impacts of Forest Fragmentation

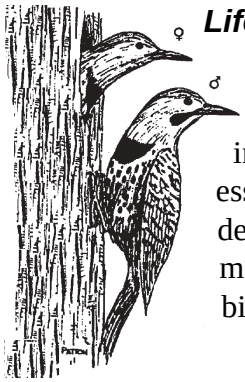
Too much edge is detrimental for some animals. Some species require large tracts of unbroken or **unfragmented forest** habitat to successfully reproduce. Most of these species are **Neotropical migrants** (birds that travel from their wintering grounds in Central and South America to nest in Midwestern forests). They arrive late in the spring and build open nests low to the ground. This is a successful nesting strategy in the deep interior of a large forest tract, but in a fragmented forest the nest will be closer to an edge, where many nest predators (e.g., skunks, raccoons, crows, jays, grackles) spend much of their hunting time.

Cowbirds also can be a problem for birds nesting in a fragmented forest. Cowbirds (found in edge habitat) are **brood parasites**, laying their egg in another bird's active nest. The host bird may end up raising a baby cowbird and none of its own young, as the larger cowbird chick crowds the others out of the nest.

Forest fragmentation (large tracts of forest broken into isolated islands of forest habitat) reduces the amount of usable habitat so birds crowd into remaining areas. Crowding leaves bird populations vulnerable to local catastrophes, disease outbreaks, or severe storms. Forest fragmentation has negatively affected wood thrush, rose-breasted grosbeak, yellow-billed and black-billed cuckoo, Tennessee warbler, worm-eating warbler, Kirkland's warbler, and ovenbird populations.



wood thrush



flickers

Life in a Dead Tree — Forest Hotels

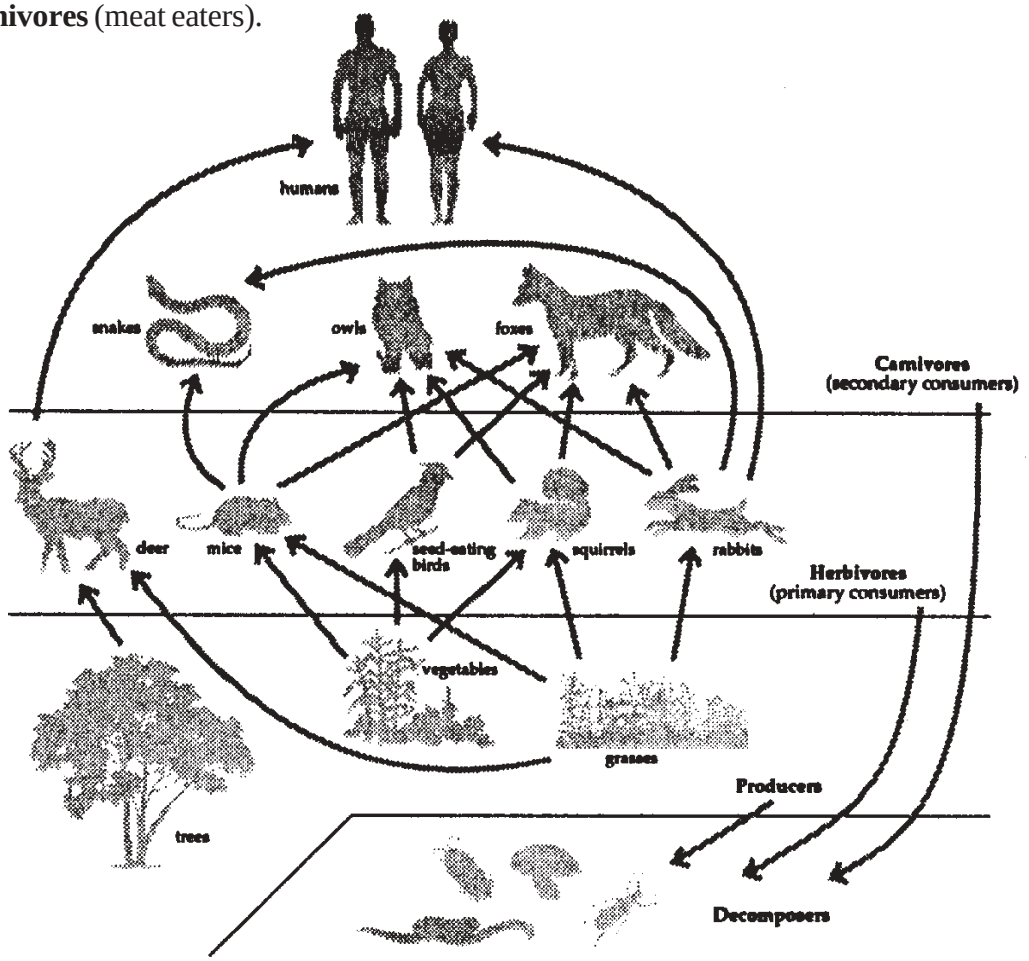
Dead trees or snags often are removed from forests for use as fuel wood, but they are an important part of forest structure. A forest managed for wildlife includes fallen logs and at least three to six standing dead trees per acre, to provide essential habitat. Oaks, maples, and basswoods make the best wildlife snags. Most dead trees left in a forest do not pose a disease threat to living trees and actually may prevent some problems by attracting woodpeckers and other insect eating birds to the area.

Over 50 species of Iowa forest animals need dead trees as part of their habitat. The six species of woodpeckers found in Iowa are **primary cavity nesters** (excavate their own nest holes and also make holes in trees while searching for insects). Chickadees, bluebirds, nuthatches, barred owls, and wood ducks are **secondary cavity nesters** (depend on the woodpeckers to make the initial excavation). Flying squirrels, bats, gray and fox squirrels, and raccoons use hollow trees as nurseries. Rabbits, shrews, and chipmunks use the cavities in dead trees to escape predators. Box turtles, skinks, snakes, tree frogs, salamanders, and many insects use rotting logs as places to find food, cover, and safe places to hibernate.

white breasted nuthatch

Food Webs

Animal species in a forest are woven together in food chains and food webs. A **food chain** is the transfer of energy from one source to another. It usually has four or five links. These chains are not isolated units, but are hooked together and form **food webs**. The organisms in a food chain can be placed into groups. **Producers** are green plants that collect and store energy from the sun. **Primary consumers** are **herbivores** (plant eaters). **Secondary consumers** are **predators** (eat other animals). **Decomposers** are **invertebrates** (animals without backbones) and fungi that return the other food chain players to the soil. Producers, herbivores, and decomposers usually are more numerous than predators or **carnivores** (meat eaters).



The energy in a food web can take many different paths. A white-footed mouse uses energy stored in an acorn it eats. A fox snake gets energy from eating and digesting the mouse. A red-tailed hawk uses the energy stored in the snake. The hawk dies and is eaten by beetles and returned to the soil.

When more of the organisms that could use the acorn are added to the picture, other predators become involved and the web can get complex. A turkey could eat the acorn and then be shot by a hunter and eaten. A bluejay could eat the acorn and then be eaten by a barred owl. A gray fox or red-tailed hawk (instead of the fox snake) may eat the mouse. An insect could bore into the acorn and be eaten by a migrating warbler and carried into another web. Food webs demonstrate how members of forests are dependent on each other and even the smallest organism is important to the whole system.

Residents, Migrants, and Winter Visitors

More than 300 wildlife species live in Iowa forests. **Resident** species make the forest their home year-round. **Migrant** species rest and gather energy in the forest during their spring and fall migrations or use Iowa forests as nesting grounds. Some wildlife species visit Iowa forests only during the winter (**winter visitors**), when the climate in their resident habitats becomes too harsh and food supplies are low.

Residents

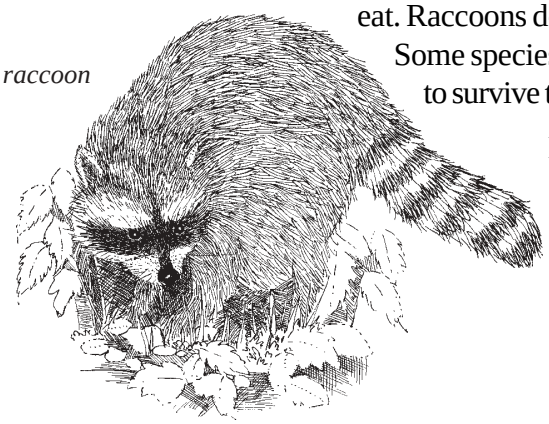
Resident animals must cope with Iowa's hot, humid summer days and cold, windy, snow-covered winters. Iowa winters usually are difficult for wildlife; food and shelter may be in limited supply. Different animals have different strategies for surviving winter.

chipmunk

Deer, rabbits, and fox squirrels put on thick fur coats and build up fat reserves to remain active all winter. Resident birds have insulating down and eat mainly seeds.

Some mammals and all reptiles and amphibians sleep or hibernate during the winter. Safe denning sites to hibernate without being found by predators is important for these animals. Reptiles and amphibians, being cold blooded, must find places to hibernate that will not freeze. The woodchuck is large enough to put on fat reserves to last the whole winter in slumber. Chipmunks must store food below ground and wake up periodically to eat. Raccoons do not hibernate, but sleep through the coldest winter spells. Some species of bats hibernate and require caves that will not be disturbed to survive the winter successfully.

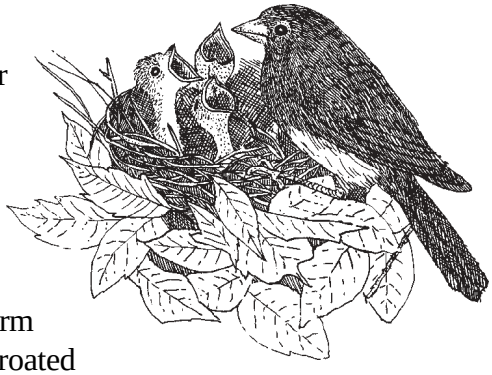
raccoon



Most forest invertebrates overwinter in a dormant stage, as an egg or pupae. Some overwinter as adults. The cicada spends the winter deep underground. Honeybees group together in their well stocked hives.

Migrants

Many migratory birds (e.g., warblers) depend on Iowa forests for refueling as they migrate to Central and South America for our winter and travel through Iowa again on their way north to their nesting grounds in the Northern U.S. and Canada. These warblers can be seen gleaning insects and buds from the tops of mature elms, maples, and basswoods.



slate colored junco

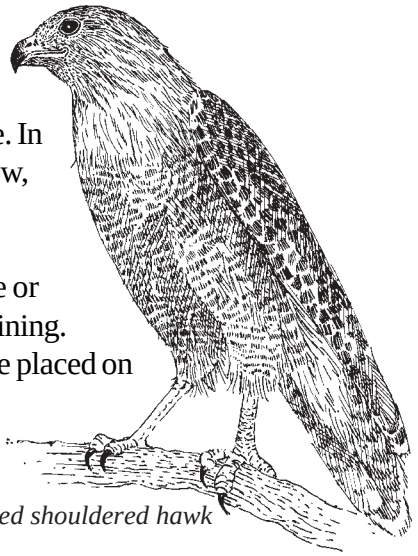
Many birds nest in Iowa forests and spend their winters in the warm south. Scarlet tanagers, ovenbirds, rose-breasted grosbeaks, ruby-throated hummingbirds, northern orioles, American redstarts, and wood thrushes are a few.

Bats that do not hibernate migrate from Iowa in the winter. Many of these species depend on hollow trees to raise their young and the summer insect supply for food.

Winter Visitors

Iowa's forested rivers are important wintering habitat for bald eagles. Juncos take advantage of birdfeeders in Iowa before returning to Canada and Alaska to nest. Snow buntings, snowy owls, and goshawks visit Iowa when winter in the northern states and Canada are severe and winter populations of their food sources are low or inaccessible.

Endangered in the Forest

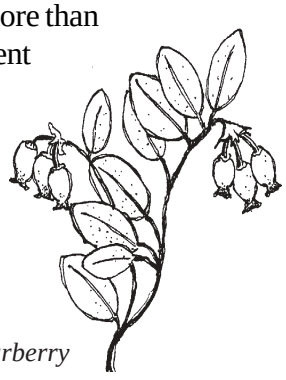


red shouldered hawk

Many wildlife species have not fared well in the changing Iowa landscape. In Iowa, 49 animals and 64 plants are listed as **endangered** (populations are low, scientists feel the species could become extinct). Another 89 plants and 35 animals are listed as **threatened** (populations are declining, may become endangered). A species can be listed as endangered or threatened at the state or federal level, depending on the extent of the area where the population is declining. Federally endangered species found within a state's borders automatically are placed on the state list. Endangered species lists constantly change. See the "Life on the Edge" activity for a list of endangered and threatened forest species or check the IDNR web page (www.iowadnr.com - click on "Threatened and Endangered Species").

Some Iowa plants are very rare. Others have not survived. Prime habitat and many native plants have disappeared because most of the state has been plowed, drained, or grazed by livestock. Over 80 native plants have not been seen here for more than 50 years. Many rare plants require special habitats. In some cases, careful management of private and public lands is needed to maintain their tenuous populations.

Several forest types meet in Iowa. Forests similar to Minnesota or northern Wisconsin are found in northeast Iowa. These forests contain shinleaf, bearberry, bunchberry, low sweet blueberry, dwarf scouring rush, twinflower, and other rare plants.



bearberry

showy ladyslipper

The dry, west-facing Loess Hills in western Iowa provide habitat similar to that of the Great Plains. Plants characteristic of western states (e.g., tumble grass, buffalo berry, slender beardtongue) are found here.

Southern Iowa woodlands contain pawpaw, mockernut hickory, pecan, and blue ash trees. Iowa's moist woodlands host rare plants such as showy ladyslipper, Hooker's orchid, jeweled shooting star, and twinleaf. Several ferns, club mosses, and orchids are endangered in Iowa.

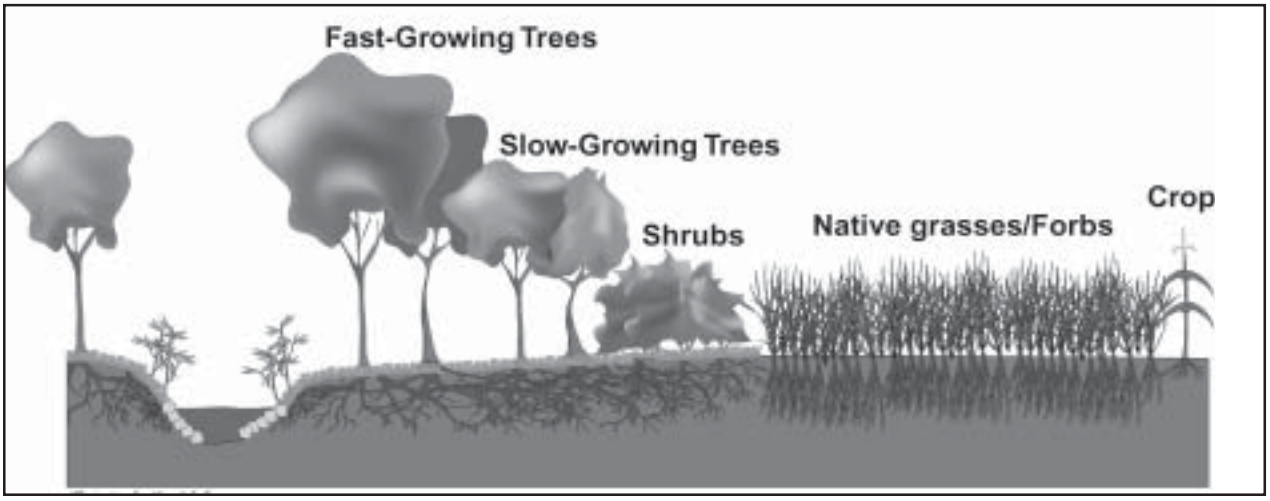
The federally endangered Iowa pleistocene land snail was found in Iowa during the pleistocene or Ice Age (10 to 15 thousand years ago). It now inhabits forested algific (cold air) slopes in northeastern Iowa along with the endangered monkshood, a flowering plant. These species require a very specialized habitat that remains cool all summer long. Only about 30 locations are known in Iowa.

The central newt, an Iowa threatened amphibian, needs small, well-vegetated woodland ponds. The wood turtle, an Iowa endangered reptile, most often is seen wandering through forests rather than in a pond or stream. Collection of this intelligent turtle as a pet has severely affected its populations. The secretive speckled kingsnake lives in the moist woodlands of southern Iowa. It is threatened in Iowa.

Bald eagles (federally threatened) depend on forested rivers for wintering roosts and nesting areas. Red-shouldered hawks are endangered because of loss of their nesting habitat–bottomland or floodplain forest.

Indiana bats are federally endangered. They live in southern Iowa forests from March to October. Very small in size, they roost under loose bark of shagbark hickory, silver maple, and cottonwood trees.

DNR file photo *federally endangered Indiana bats*



Iowa State University, Division of Forestry *diagram of a riparian buffer*

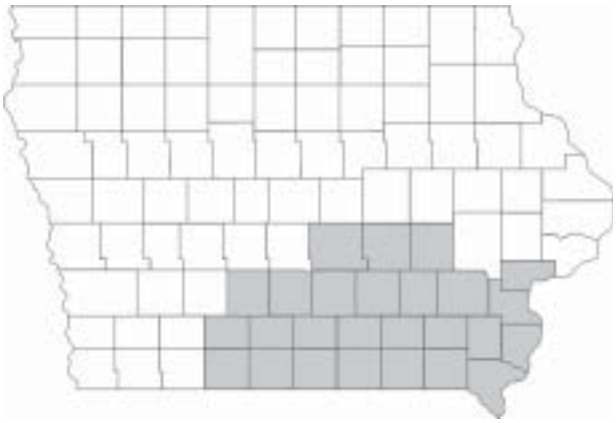
Iowa State University, Division of Forestry *photo of a riparian buffer*

Forests act as buffers, by filtering sediments and harmful chemicals from water before it reaches rivers, streams, and lakes. Forested soils have high infiltration rates and tree tops intercept rain before it reaches the ground, benefiting water quality. The IDNR, Iowa State University, private non-profit conservation groups, and private landowners are implementing special watershed protection projects that include **riparian** (stream bank areas) buffers along streams used by the Topeka shiner, a federally threatened minnow. The federally endangered Higgin's-eye pearly mussel is dependent on good water quality, control of invasive non-native aquatic species, and areas free from disturbance such as mussel harvesting.

Protecting Endangered Species

Habitat loss is usually the main reason a species becomes endangered. Protecting and properly managing Iowa's remaining forested areas that support rare, threatened, or endangered species is an important task.

IDNR foresters work with landowners and loggers to identify roosting trees in southern Iowa and prevent disturbance of Indiana bats (federally endangered) during their reproductive season. Harvesting trees (over nine inches in diameter) is not permitted in most southern Iowa forests between April 1 and September 30.



counties with harvest restrictions for Indiana bats

Chemical pollutants (e.g., pesticides) may affect **nontarget organisms** (plants or animals other than the targeted pest) and can further endanger wildlife. Forest managers must be aware of potential problems from outside pollutants that may enter ecosystems from a distant source.

Collecting animals or picking plants can further imperil rare species (e.g., wood turtle). It is against the law in Iowa to keep a wild animal as a pet. Some animals may be kept for educational purposes, but a permit from IDNR is required.

There are many reasons to save and manage for endangered species.

- People are dependent on nature's systems. The loss of species from these systems may have irreversible effects. All the strands of our complex web are needed to maintain its strength.
- Most of our foods and medicines come from plants. Wild plants are storehouses of genetic material that may be used to discover the cure for a disease such as AIDS or one that threatens corn plants, or a pest resistant tomato plant. Processes needed to isolate and test plant chemicals are slow–up to ten years to research one chemical.
- Wildlife has aesthetic value. People work to save endangered species and prevent others from becoming endangered because they have a right to exist, and are beautiful and thrilling to see.

Other Materials

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enature.com (online field guides)
endangered.fws.gov (federal list of endangered/threatened animals and plants)
www.iowadnr.com/other/threatened.html (Iowa threatened/endangered species list)

www.legis.state.ia.us (Iowa Administrative Code–#571, Chapter 77, state endangered and threatened species list)

PLT Activities (grade level)

400-Acre Wood (7-8)
A Look at Lifestyles (5-8)
Adopt a Tree (3-8)
Are Vacant Lots Vacant? (4-8)
Birds and Worms (K-6)
Charting Diversity (4-8)
Dynamic Duos (5-8)
Environmental Exchange Box (K-8)
Fallen Log, The (4-8)
Field, Forest, and Stream (4-8)
Forest of S.T. Shrew, The (1-6)
Life on the Edge (4-8)
Nature's Recyclers (1-6)
Peppermint Beetle, The (K-6)
Planet of Plenty (4-6)
Picture This! (PreK-3)
School Yard Safari (PreK-5)
Trees as Habits (3-8)
Web of Life (4-8)

** Supplemental information provided for italicized activities.*